AAB18144 AAB19802 AAB48453

AAB48452

Human laminin 2 mandaman laminin 2 mandaman laminin 2 mandaman laminin 2 mandaman laminin 3 mandaman laminin 3 mandaman laminin 3 mandaman laminin 3 mandaman laminin 2 mandaman laminin 2 mandaman laminin 2 mandaman laminin 2 mandaman laminin 3 mandaman laminin 2 mandaman laminin 2 mandaman laminin 3 mandaman laminin 2 mandaman laminin 3 mandaman laminin 2 mandaman laminin

AAB48455 AAB19805 AAB48454 AAY79332

AAB70255 AAB70256 AAB25863 AAB25864 AAB25864 AAB25864

Mouse laminin 2 m Mouse laminin 2 a Human laminin 2 m Human laminin 2 m

Merosin major

ALIGNMENTS

FOUND INC.

99US-0118634. 99US-0122372. 99US-0124905. 99US-0131121.

AAB19792

```
Immobilisation antigen; i-antigen; ichthyophthiriasis; vaccine; white spot disease; freshwater fish; immune response; infection control.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 55kD i-antigen protein of parasite isolate G5.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAB25860 standard; Protein; 468 AA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CORNELL RES FOUND INC
CLARK T G.
DICKERSON H W.
LIN T.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ichthyophthirius multifillis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           04-FEB-2000; 2000WO-US02962
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 18-DEC-2000 (first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Clark TG, Dickerson HW,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         UYGE-) UNIV GEORGIA RES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               WO200046373-A1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    04-FEB-1999;
02-MAR-1999;
17-MAR-1999;
27-APR-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           10-AUG-2000
203.12
203.12
188
188
188
188
188
188
198
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
179.5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAB25860;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    (CORR )
(CLAR/)
(DICK/)
(LINT/)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAB25860
THE STATE OF THE S
                                                                                                                                                                                            December 26, 2001, 10:31:54 ; Search time 25.02 Seconds (without alignments) 1385.544 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Synthetic 55kD i-a
48kD i-antigen pro
48 kDa immobilizat
1A648 (G1) surface
55kD i-antigen ami
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 55kD i-antigen pro
55 kDa immobilizat
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.
                                                                                                                                                                                                                                                                                                                     US-09-497-967-7
2540
1 MKNNILVILLISLFINQIKS......QCDFANFLSISLLLISYYLL 468
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Description
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  **SIDSB*/gcgdata/geneseqy/An1980.DAT:**

**SIDSB*/gcgdata/geneseqy/An1981.DAT:**

**SIDSB*/gcgdata/geneseqy/geneseqp/An1981.DAT:**

**SIDSB*/gcgdata/geneseqy/geneseqp/An1981.DAT:**

**SIDSB*/gcgdata/geneseqy/geneseqp/An1981.DAT:**

**SIDSB*/gcgdata/geneseqy/geneseqp/An1985.DAT:**

**SIDSB*/gcgdata/geneseqy/geneseqp/An1986.DAT:**

**SIDSB*/gcgdata/geneseqy/geneseqp/An1980.DAT:**

**SIDSB*/gcgdata/geneseqy/geneseqp/An1980.DAT:**

**SIDSB*/gcgdata/geneseqy/geneseqp/An1980.DAT:**

**SIDSB*/gcgdata/geneseqy/geneseqp/An1991.DAT:**

**SIDSB*/gcgdata/geneseqy/geneseqpy/An1991.DAT:**

**SIDSB*/gcgdata/geneseqy/geneseqpy/An1991.DAT:**

**SIDSB*/gcgdata/geneseqy/geneseqpy/An1991.DAT:**

**SIDSB*/gcgdata/geneseqy/geneseqpy/An1991.DAT:**

**SIDSB*/gcgdata/geneseqy/geneseqgy/An1991.DAT:**

**SIDSB*/gcgdata/geneseqy/geneseqgy/An1991.DAT:**

**SIDSB*/gcgdata/geneseqy/geneseqgy/An1991.DAT:**

**SIDSB
             GenCore version 4.5
Copyright (c) 1993 - 2000 Compugen Ltd.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Total number of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       522463 segs, 74073290 residues
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries

    protein search, using sw model

                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAY97177
AAB25882
AAB25889
AAY97176
AAB25889
AAB25888
AAB25888
AAB25888
AAB25888
                                                                                                                                                                                                                                                                                                                                                                                                                                                            BLOSUM62
Gapop 10.0 , Gapext 0.5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      length: 0
length: 2000000000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     A_Geneseq_1101:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          468
468
4442
4442
70
70
71
71
71
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query
Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       100.0
100.0
99.7
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     36.3
36.3
31.6
116.7
115.9
14.8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      sed
                                                                                                                                                                                                                                                                                                                                                          Perfect score:
Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                            Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Minimum DB
Maximum DB
                                                                                                                                      OM protein
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Searched:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Database
                                                                                                                                                                                               Run on:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          6450789011
110987651
```

(first entry)

04-DEC-2000

AAY97177;

```
This invention relates to novel 1-antigen polypepture sequences.

Tankigens or immobilisation antigens ar common to a variety of properties or immobilisation antigens ar common to a variety of properties or immobilisation antigens are common at a common and their expression varies in response to any incommental stimuli This invention relates to i-antigens in any incommental stimuli This invention relates to i-antigens in controlled the causing ichthyophthirlass or white spot disease. The of freshwater fish causing ichthyophthirlass or white spot disease. The invention includes two polypeptide and polynucleotide sequences for two i-antigens of 48 and 55 kb. Also included in the invention are intibodies capable of binding to the nucleotide sequences and a method antibodies capable of binding to the nucleotide sequences. For identifying I. multifiliis serotypes using the nucleotide sequences. A composition (containing the i-antigen nucleotide or prophylaxis, treatment or for an immune response in fish is useful for prophylaxis, treatment or for controlling I. multifiliis infection in fish. Polynucleotide or protein vaccines comprising a portion of the amplified product encoding an antigent i antigen polypeptide obtained is also useful for treating or preventing I. multifiliis infection in fish. Sequences AAA97036-A97042, preventing I. multifiliis infection in fish. Sequences and gene fragments identified in the invention. Sequences AAA97031-A9708 call and AAA97060) and AAA97081-A97088 represent trantigen pane sequences. Sequences AAB25899-B25806 represent i-antigen protein and peptide sequences.
                                               Novel i-antigen polypeptides and polynucleotides from Ichthyophthirius multifillis, useful for prophylaxis and treatment of Ichthyophthirius infection in fish
                                                                                                                                                                                                                                                invention relates to novel i-antigen polypeptide sequences
                                                                                                                                                                                          Claim 3; Figure 3; 144pp; English.
WPI; 2000-506071/45
```

468 AA; Sequence

```
ö
                                                                                                                                                                                     AATLAKQCNIACPDGTAIASGATNYVILQTECLNCAANFYFDGNNFQAGSSRCKACPANK 360
                                                                                                                                                                                                                                     VQGAVATAGGTATLIAQCALECPAGTVLTDGTTSTYKQAASECVKCAANFYTTKQTDWVA 420
                                                                                                                                                                                                                                                                         NEYNENAPNENAGASTCTACPVNRVGGALTAGNAATIVAQCNVACPTGTALDDGVTTDYV 180
                                                                                                                      61 PGASTCTPCPQKKDAGAQPNPPATANLVTQCNVKCPAGTAIAGGATDYAAIITECVNCRI 120
                                                                                 Gaps
                                                                                                                                                 RSFTECVKCRLNFYYNGNNGNTPFNPGKSQCTPCPAIKPANVAQATLGNDATITAQCNVA
                  ;
0
100.0%; Score 2540; DB 21; Length 468; 100.0%; Pred. No. 5.8e-194; Live 0; Mismatches 0; Indels 0;
                                                                                                                                                                                                                                                                                                      421 GIDTCTSCNKKLTSGAEANLPESAKKNIQCDFANFLSISLLLISYYLL 468
                                                                                                                                                                                                                                                                                                               421 gidtctscnkkltsgaeanlpesakknigcdfanflsislllisyyll 468
                      468; Conservative
             Similarity
   Query Match
Best Local S
                                                                                                                                                                                                                                301
                                                                                                                                                                                                                                                                      361
                                                                                                                 121
                                                                                                                                                       181
                       Matches
                                                                                                                                                                                                                                                                                                          ò
                                                                                                                                                                                                                                                                                                                           g
                                                                                                                                                                     g
                                                                                                                                                                                          οy
                                                                                                                                                                                                             셤
                                                                                                                                                                                                                                δ
                                                                                                                                                                                                                                                 qq
                                                                                                                                                                                                                                                                      ò
                                                                                                                                                                                                                                                                                     В
                                                                                                                                  q
                                                                                                                                                       ò
                                                          셤
                                                                              à
                                                                                                qq
                                                                                                                 οy
```

468 AA;

Sequence

AAY97177 standard; Protein; 468 AA.

~

RESULT

AAY97177 ID AAY9

```
Tetrahymena thermophila expresses two major beta-tubulin genes (BTU1 and BTU2), which encode identical beta-tubulin proteins. Either of these two genes (but not both at once) can be disrupted without a detectable change content confers increased resistance to microtubule-depolymerizing drugs and increased sensitivity to pacificatel, a microtubule-stabilizing drug. Cells carrying the Btu1-1K350M allele can be transformed to pacificatel cells carrying the Btu1-1K350M allele can be transformed to pacificatel cells carrying the Btu1-1K350M with a wild-type BTU1 gene fragment, eliminating the need to incorporate a means for positive containing the btu1-1K350M allele. BTU1: neol construct, which containing the btu1-1K350M allele, BTU1: neol construct, which substitutes the coding region of the neol gene (conferring resistance to substitutes the coding region of the neol gene (conferring resistance to and for positive selection. Heterologous nucleic acids (especially and for positive selection. Heterologous nucleic acids (especially concoding antigenic polypeptides) can be inserted into a BTU1 gene for selection. Preferred expression that is maintained by way of negative selection. Preferred expression that is maintained by way of negative concoding antigenic polypeptides) can be inserted into a cide conferior acid, thereby restoring resistance to paclitaxel in the resulting caid, thereby restoring resistance to paclitaxel in the resulting caid, thereby restoring resistance to paclitaxel in the resulting caid, thereby restoring resistance are useful as live vaccines are useful as live vaccines.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         for attimulating an immune response in a vertebrate. The transgenic protozoan host cells are also useful for producing polyclonal antibodies (claimed). In particular, Tetrahymena expressing Ichthyophthius multifilis immobilization-antigen (i-antigen) protein on their surface are effective vehicles for vaccination of freshwater fish against infection by I. multifilis.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Recombinant expression systems for expressing heterologous nucleic acids and producing recombinant protein, comprises nonpathogenic protozoa such as Tetrahymena resistant to paclitaxel
                                                                                                                             BIUI; beta-tubulin; protein expression system; negative selection; paclitaxel sensitivity; cell surface; antigen; protozoa; ciliate; live vaccine; Ichthyophthilus multifillis; immobilization-antigen;
                                                                                                                                                                                                                                                                                                        Misc-difference 1..468
/note= "Gln encoded by CAR or TAA"
                                                                                                                                                                                            i-antigen; freshwater; fish; protozoacide
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Clark TG;
                                                                                                                                                                                                                                                                                  Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   (UYGE-) UNIV GEORGIA RES FOUND INC.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Disclosure; Fig 3A; 83pp; English.
                                                                                              55 kDa immobilization antigen.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              99US-0118634.
                                                                                                                                                                                                                                           Ichthyophthiius multifiliis
                                                                                                                                                                                                                                                                                                                                                                                                                                                     2000WO-US02966
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        99US-0124905
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          99US-0131121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Gaertig J, Dickerson HW,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         (DICK/) DICKERSON H W. (CLAR/) CLARK T G.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  WPI; 2000-514962/46.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        N-PSDB; AAA52136
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GAERTIG
                                                                                                                                                                                                                                                                                                                                                                        WO200046381-A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            04-FEB-1999;
02-MAR-1999;
17-MAR-1999;
27-APR-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                         04-FEB-2000;
                                                                                                                                                                                                                                                                                                                                                                                                                 10-AUG-2000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         (GAER/)
(DICK/)
```

Novel i-antigen polypeptides and polynucleotides from Ichthyophthirius multifillis, useful for prophylaxis and treatment of Ichthyophthirius infection in fish

WPI; 2000-506071/45

English

Example 5; Figure 14; 144pp;

```
ö
                                                                                                                                                                                                                                                                                                                                                                                                                                 Immobilisation antigen; i-antigen; ichthyophthiriasis; vaccine;
White spot disease; freshwater fish; immune response; infection control.
                                                                      PGASTCTPCPQKKDAGAQPNPPATANLVTQCNVKCPAGTAIAGGATDYAAIITECVNCRI 120
                                                                                RSFTECVKCRLNFYYNGNNGNTPFNPGKSQCTPCPAIKPANVAQATLGNDATITAQCNVA 240
                                                                                                                                                        AATLAKQCNIACPDGTAIASGATNYVILQTECLNCAANFYFDGNNFQAGSSRCKACPANK 360
                      Gaps
                                                                                                                                                                                                                               VQGAVATAGGTATLIAQCALECPAGTVLTDGTTSTYKQAASECVKCAANFYTTKQTDWVA 420
                                                                                                                                                                                                                                                                 9
                                                        9
                                  1 MKNNILVILIISLFINQIKSANCPVGTETNTAGQVDDLGTPANCVNCQKNFYYNNAAAFV
                                            121 NFYNENAPNFNAGASTCTACPVNRVGGALTAGNAATIVAQCNVACPTGTALDDGVTTDYV
                                                                                                                                                                                 CPDGTISAAGVNNWVAQNTECTNCAPNFYNNNAPNFNPGNSTCLPCPANKDYGAEATAGG
    Length 468;
                                                                                                                                                                                                                                                                                          421 GIDTCTSCNKKLTSGAEANLPESAKKNIQCDFANFLSISLLLISYYLL 468
                                                                                                                                                                                                                                                                                                       Indels
100.0%; Score 2540; DB 21;
100.0%; Pred. No. 5.8e-194;
1ve 0; Mismatches 0; :
                                                                                                                                                                                                                                                                                                                                                                                                               Synthetic 55kD 1-antigen protein L6P
                                                                                                                                                                                                                                                                                                                                                              Ą.
                                                                                                                                                                                                                                                                                                                                                          AAB25882 standard; Protein; 468
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     99US-0122372.
99US-0124905.
99US-0131121.
                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ichthyophthirius multifiliis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          04-FEB-2000; 2000WO-US02962
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              99US-0118634.
                                                                                                                                                                                                                                                                                                                                                                                                (first entry)
                  Conservative
         Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       WO200046373-A1.
                                                                                                                                                                                                                                                                                                                                                                                               18-DEC-2000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     02-MAR-1999;
17-MAR-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              04-FEB-1999;
                   468;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         10-AUG-2000
Query Match
Best Local Si
Matches 468;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Synthetic.
                                                                                                                                                                                                                                                                                                              421
                                                                                                                            121
                                                                                                                                              181
                                                                                                                                                                181
                                                                                                                                                                                  241
                                                                                                                                                                                                                     301
                                                                                                                                                                                                                                      301
                                                                                                                                                                                                                                                         361
                                                                                                                                                                                                                                                                           361
                                                                      à
                                                                                                                        a
                                                                                                                                                           g
                                                                                      g
                                                                                                     ò
                                                                                                                                            ö
                                                                                                                                                                               õ
                                                                                                                                                                                                 q
                                                                                                                                                                                                                    ò
                                                                                                                                                                                                                                   g
                                                                                                                                                                                                                                                                         g
                                                                                                                                                                                                                                                                                          à
                                                                                                                                                                                                                                                        ð
```

This invention relates to novel i-antigen polypeptide sequences.

Controllisation antigens ar common to a variety of hymenostomatid cilitates and their expression varies in response to environmental stimuli. This invention relates to i-antigens in circle and their expension of i-antigens in circle and in the an obligate parasite of freshwater fish causing lothtyophthiras, or white spot disease. The invention includes two polypeptide and polynuclectide sequences for two i-antigens, of 48 and 55 kb. Also included in the invention are intibodies capable of binding to the nuclectide sequences and a method for identifying I. multifillis servicypes using the nuclectide sequences.

A composition (containing the i-antigen nuclectide) capable of eliciting an immune response in fish is useful for prophylaxis, treatment or for controlling I. multifillis infection in fish. Polynuclectide or protein antigent i -antigen polypeptide obtained is also useful for treating or preventing I. multifillis infection in fish. Sequences AAA9703-A97044, and AAA97060) and AAA97089 represent i-antigen genes and gene fragments identified in the invention. Sequences AAA9703-A97064 (excluding AAA97060) and AAA97009 represent primers used in the isolation of the i-antigen gene sequences. Sequences AAB25899-B25889 and AAB25893-B25906 represent i antigen protein and peptide sequences.

```
ö
                                                                                                                                                                                                                                                                                                                           NFYNENAPNFNAGASTCTACPVNRVGGALTAGNAATIVAQCNVACPTGTALDDGVTTDYV 180
                                                                                                                                                                                                                                                                                                                                                       CPDGTISAAGVNNWVAQNTECTNCAPNFYNNNAPNFNPGNSTCLPCPANKDYGAEATAGG 300
                                                                                                                                                                                                                                                                                                                                                                                                                        300
                                                                                                                                                                                                                                                                                                                                                                                                                                        360
                                                                                                                                                                                                                                                                                                                                                                                                                                              VQGAVATAGGTATLIAQCALECPAGTVLTDGTTSTYKQAASECVKCAANFYTTKQTDWVA 420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            9
                                                                                                                                                                                                                                                                                            1 MKNNILVILIISLFINQIKSANCPVGTETNTAGQVDDLGTPANCVNCQKNFYYNNAAAFV
                                                                                                                                                                                                                                                                                                                  61 PGASTCTPCPQKKDAGAQPNPPATANLVTQCNVKCPAGTAIAGGATDYAAIITECVNCRI
                                                                                                                                                                                                                                                                                                                                                                            RSFTECVKCRLNFYYNGNNGNTPFNPGKSQCTPCPAIKPANVAQATLGNDATITAQCNVA
                                                                                                                                                                                                                                                                                                                                                                                     241 cpdgtisaagvnnwvagntectncapnfynnnapnfnpgnstclpcpankdygaeatagg
                                                                                                                                                                                                                                                                                                                                                                                                                                       AATLAKQCNIACPDGTAIASGATNYVILQTECLNCAANFYFDGNNFQAGSSRCKACPANK
                                                                                                                                                                                                                                                                                                                                                                                                                 ö
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GIDTCTSCNKKLTSGAEANLPESAKKNIQCDFANFLSISLLLISYYLL 468
                                                                                                                                                                                                                                                        Score 2533; DB 21;
Pred. No. 2.1e-193;
); Mismatches 1;
                                                                                                                                                                                                                                                                      ;
                                                                                                                                                                                                                                                      99.78;
                                                                                                                                                                                                                                                                     Matches 467; Conservative
                                                                                                                                                                                                                                                               Similarity
                                                                                                                                                                                                                                 468 AA;
                                                                                                                                                                                                                                  Sednence
                                                                                                                                                                                                                                                       Query Match
                                                                                                                                                                                                                                                               Local
                                                                                                                                                                                                                                                                                                                                                                                                                                      301
                                                                                                                                                                                                                                                                                                                                61
                                                                                                                                                                                                                                                                                                                                              121
                                                                                                                                                                                                                                                                                                                                                                                          181
                                                                                                                                                                                                                                                                                                                                                                            181
                                                                                                                                                                                                                                                                                                                                                                                                                                                     301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               421
                                                                                                                                                                                                                                                               Best
셤
                                                                                                                                                                                                                                                                                                                 ŏ
                                                                                                                                                                                                                                                                                                                               q
                                                                                                                                                                                                                                                                                                                                              ò
                                                                                                                                                                                                                                                                                                                                                            g
                                                                                                                                                                                                                                                                                                                                                                                        g
                                                                                                                                                                                                                                                                                                                                                                            ã
                                                                                                                                                                                                                                                                                                                                                                                                         ò
                                                                                                                                                                                                                                                                                                                                                                                                                      g
                                                                                                                                                                                                                                                                                                                                                                                                                                      à
                                                                                                                                                                                                                                                                                                                                                                                                                                                   g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ò
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               QC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ò
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             g
```

RESULT AAB25859

UNIV GEORGIA RES FOUND INC

27-APR-1999;

CORNELL RES FOUND INC. CLARK I G.

(UYGE-) (CCORR) (CLAR/) (

CLARK T G. DICKERSON H W.

Dickerson HW,

Clark TG,

(LINI/)

```
This invention relates to novel i-antigen polypeptide sequences.

1-antigens or immobilisation antigens ar common to a variety of hymenostomatid ciliates and their expression varies in response to environmental stimuli. This invention relates to i-antigens in environmental stimuli. This invention relates to i-antigens in controlled causing ichthyophthitasis or white spot disease. The invention includes two polypeptide and polynucleotide sequences for two invention includes two polypeptide and polynucleotide sequences for two invention includes two polypeptide and polynucleotide sequences for two intentions, of 48 and 55 kD. Also included in the invention are antigens, of binding to the nucleotide sequences and a method antigention (containing the i-antigen nucleotide) capable of eliciting a numune response in fish is useful for prophylaxis; treatment or for controlling I. multifiliis infection in fish. Polynucleotide or protein vaccines comprising a portion of the amplified product encoding an antigenic i-antigen polypeptide obtained is also useful for treating or antigenic i-antigen polypeptide obtained is also useful for treating or antigenic i-antigen polypeptide obtained is also useful for treating or antigened in multifiliis infection in fish. Sequences AAA37035-A97042, and AAA37060, AAA37065 and AAA37089 represent trantigen genes and gene fragments identified in the invention. Sequences AAA37035-A97064 (excluding AAA37060) and AAA37071-A37088 represent primers used in the isolation of the 1-antigen gene sequences. Sequences AAB25899 and AAB25893-B25906 represent i-antigen genesent i-antigen and peptide sequences.
                                                                                                                                             Immobilisation antigen; i-antigen; ichthyophthiriasis; vaccine;
white spot disease; freshwater fish; immune response; infection control.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Novel i-antigen polypeptides and polynucleotides from Ichthyophthirius multifiliis, useful for prophylaxis and treatment of Ichthyophthirius infection in fish
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Mismatches 139; Indels 114;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      36.3%; Score 921; DB 21;
ilarity 41.8%; Pred. No. 3.4e-65;
Conservative 45; Mismatches 139;
                                                                                                                                                                                                                                                                                                                                                                                                                                                             UNIV GEORGIA RES FOUND INC.
AAB25859 standard; Protein; 442 AA.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Claim 1; Figure 1; 144pp; English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Lin T;
                                                                                                                 18kD i-antigen protein sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CORNELL RES FOUND INC
CLARK T G.
DICKERSON H W.
                                                                                                                                                                                                                                                                                                                                                              99US-0118634.
99US-0122372.
99US-0124905.
99US-0131121.
                                                                                                                                                                                                          Ichthyophthirius multifiliis
                                                                                                                                                                                                                                                                                                                          2000WO-US02962
                                                                             (first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Dickerson HW,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   WPI; 2000-506071/45.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Local Similarity
es 214; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     442
                                                                                                                                                                                                                                                   WO200046373-A1
                                                                                                                                                                                                                                                                                                                              04-FEB-2000;
                                                                                                                                                                                                                                                                                                                                                                                    02-MAR-1999;
17-MAR-1999;
                                                                          18-DEC-2000
                                                                                                                                                                                                                                                                                                                                                                  04-FEB-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                         27-APR-1999;
                                                                                                                                                                                                                                                                                         10-AUG-2000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Clark TG,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                (CORR) (CLAR/) (DICK/) I
                                    AAB25859;
                                                                                                                                                                                                                                                                                                                                                                                                                                                               UYGE-)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Best Loc
Matches
```

```
320
                                                                                                                                                                                             380 LECPAGIVLIDGIISTYKQAASECVKCAANFYITKQIDWVAGIDICTSCNKKLISGAEAN 439
                                                                                                                                                                                                                                                                                   222 VAQATLGNDATITAQCNVACPDGTISAAGVNNWVAQNTE---CTNCAPNFYNN-----N 272
                                                                                                       AAFVPGASTCTPCPQKKDAGAQPNPPATANLVTQCNVKCPAGTAIAGGATDYAAIITECV 116
                                                                                         221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        BTUI; beta-tubulin; protein expression system; negative selection; paclitaxel sensitivity; cell surface; antigen; protozoa; ciliate; live vaccine; Ichthyophthilus multifillis; immobilization-antigen; i-antigen; freshwater; fish; protozoacide.
                                                                                                                                                                                 273 APN---FNPG-----NSTCLPCPANKDYGAEATAGGAATLAKQCNIACPDGTAIAS
                                                                                                                                                                                                                            321 GAT-NYVILQTECINCAANFYFDGNNFQAGSSRCKACPANKVQGAVATAGGTATLIAQCA
                                                                                          ---KSOCTPCPAIKPAN
                                                                                                                                                        dspatagaganlatqcsnqcptgtvlddgvt--lvfntsatlcvkcrpnfyynggspqge
                                              117 NCRINEYNENAPNFNAGASTCTACPVNRVGGALTAGNAATIVAQCNVACPTGTALDDGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            /note= "Gln encoded by CAR, TAG or TAA"
                                                                                            177 TDYVRSFTECVKCRLNFYYNGNN--GNTP----FNPG-
                                                                                                                                                                                                                                                                                                                                  : |::|| || |||||||| ||:||| 41] yaeatqkvqcasttfakflsisllfisfyll 442
                                                                                                                                                                                                                                                                                                                       440 LPESAKKNIQC---DFANFLSISLLLISYYLL 468
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Clark TG;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Location/Qualifiers
                           --geangngpfaan
                                                                                                                                                                                                                                                                                                                                                                                                      Æ.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               FOUND INC
                                                                                                                                                                                                                                                                                                                                                                                                    AAY97176 standard; Protein; 442
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        48 kDa immobilization-antigen.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  99US-0122372.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       99US-0118634
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ichthyophthiius multifiliis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 04-FEB-2000; 2000WO-US02966
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        99US-0131121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Dickerson HW,
                                                                                                                                                                                                                                                                                                                                                                                                                                                  (first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               (UYGE-) UNIV GEORGIA RES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   (DICK/) DICKERSON H W. (CLAR/) CLARK T G.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            WPI; 2000-514962/46.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Misc-difference
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GAERTIG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      WO200046381-A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        04-FEB-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    02-MAR-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          27-APR-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                   04-DEC-2000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           10-AUG-2000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              17-MAR-1999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Gaertig J,
                                aa---
                                                                                                                                                                                                                                                                                                                                                                                                                            AAY97176;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            (GAER/)
                                                                                                                                                                                                                                                                                                                                                                                   S
                                                                                                                                                                                                                                                        293
                             57
                                                                         72
                                                                                                                                                                                                                                                                                                                                                                                         AAY97176
                                                                                                                                                                                                                                                                                                                                                                                                                             g
                                                                                                                                                                                                            셤
                                                                                                                                                                                                                                                       qq
                                                                                                                                                                                                                                                                               ŏ
                                                                                                                                                                                                                                                                                                    g
                                                                                                                                                                                                                                                                                                                           Ω
                                                     οy
                                                                          8
                                                                                                δy
                                                                                                                     a
                                                                                                                                            δy
                                                                                                                                                                 g
                                                                                                                                                                                       οy
                                                                                                                                                                                                                                    οy
```

19;

Gaps

Length 442;

1 MKNNILVILIISLEINQIKSANCPVGTETNTAGQVD----DLGTPANCVNCQKNFYYNNA 56

> q ò

ഗ

```
Tetrahymena thermophila expresses two major beta-tubulin genes (BTUI and BTU2), which encode identical beta-tubulin proteins. Either of these two genes (but not both at once) can be disrupted without a detectable change in the cell phenotype. A K350L substitution in the BTUI beta-tubulin protein confers increased resistance to microtubule-depolymerizing drugs and increased sensitivity to paclitaxel, a microtubule-stabilizing drug. Cells carrying the Btu1-1K350M allele can be transformed to paclitaxel resistance by gene replacement of Btu1-1K350M with a wild-type BTUI gene containing the Btu1-1K350M allele, Btu1-1K350M with a wild-type BTUI gene containing the Btu1-1K350M allele, BTUI: incol construct, which substitutes the coding region of the neol gene (conferring resistance to parmomycln) for that of BTUI, can be used to generate BTUI gene knockouts and for positive selection. Heterologous nucleic acids (especially concessful cell-surface expression that is maintained by way of negative selection. Preferred expression that is maintained by way of negative selection. Preferred expression that is maintained by way of negative selection. Preferred expression that is maintained by way of negative cald, thereby restoring resistance to paclitaxel in the resulting cransgenic ciliated proteczea are useful as live vaccines for stimulating an immune response in a vertebrate. The transgenic contained containing claimed proteczea are useful as live multifillis immobilization-antigen (i-antigen) protein on their surface contained in an energenic ciliated expression of freshwater fish against infance infanc
                                                            Recombinant expression systems for expressing heterologous nucleic acids and producing recombinant protein, comprises nonpathogenic protozoa such as Tetrahymena resistant to paclitaxel
                                                                                                                                                                                                        Disclosure; Fig 3A; 83pp; English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            infection by I. multifiliis.
N-PSDB; AAA52134, AAA52135
```

Sequence 442 AA;

19; 57 AAFVPGASTCTPCPQKKDAGAQPNPPATANLVTQCNVKCPAGTAIAGGATDYAAIITECV 116 117 NCRINFYNENAPNFNAGASTCTACPVNRVGGALTAGNAATIVAQCNVACPTGTALDDGVT 176 177 IDYVRSFTECVKCRLNFYYNGNN--GNTP----FNPG------KSQCTPCPAIKPAN 221 118 dvfdrsaaqcvkckpnfyynggspqgeapgvqvfaagaaaagvaavtsqcvpcqlnk--n 175 222 VAQATLGNDATITAQCNVACPDGTISAAGVNNWVAQNTE---CTNCAPNFYNN-----N 272 : || | | : ||: || ||: || dspataganlatgcsnqcptgtvlddgvt--lvfntsatlcvkcrpnfyynggspgge 233 273 APN---FNPG----NSTCLPCPANKDYGAEATAGGAATLAKQCNIACPDGTAIAS 320 234 apgvqvfaagaaaagvaavtsqcvpcqinkn-dspatagaqanlatqcstqcptgtaiqd 292 GAT-NYVILQTECLNCAANFYFDGNNFQAGSSRCKACPANKVQGAVATAGGTATLIAQCA 379 380 LECPAGTVLTDGTTSTYKQAASECVKCAANFYTTKQTDWVAGIDTCTSCNKKLTSGAEAN 439 36.3%; Score 921; DB 21; Length 442; 41.8%; Pred. No. 3.4e-65; Live 45; Mismatches 139; Indels 114; Gaps 1 MKNNILVILIISLFINQIKSANCPVGTETNTAGQVD----DLGTPANCVNCQKNFYYNNA 56 aa------ggeangngpfaan---------a Local Similarity 41.8%; Matches 214; Conservative Query Match 57 321 ð a ð g à ద ð g à g Š g ò 8 ð

fragments identified in the invention. Sequences AAA97043-A97064 (excluding AAA97060) and AAA97071-A97088 represent primers used in the isolation of the i-antigen gene sequences. Sequences AAB25859-B25889 and AAB25893-B25806 represent i-antigen protein and peptide sequences.

409

Sequence

antigenic i-antigen polypeptide obtained is also useful for treating or preventing I: multifillis infection in fish. Sequences AAA97035-A97042, and AAA97060, AAA97065 and AAA97089 represent i-antigen genes and gene fragments identified in the invention. Sequences AAA97043-A997064

```
This invention relates to novel i-antigen polypeptide sequences.

I antigens or immobilisation antigens ar common to a variety of hymenostomatid ciliates and their expression varies in response to environmental stimuli. This invention relates to i-antigens in Interpolate and interpolate to i-antigens in of freshwater fish causing inthypoththials or i-antigens. Of freshwater fish causing ichthyophthials or white spot disease. The invention includes two polypeptide and polynuclectide sequences for two i-antigens, of 48 and 55 kD. Also included in the invention are invention includes two polypeptide and polynuclectide sequences and a method for identifying I. multifillis serviypes using the nuclectide sequences. A composition (containing the i-antigen nuclectide capable of eliciting in immune response in fish is useful for prophylaxis, treatment or for controlling I. multifillis infection in fish. Polynuclectide or protein controlling I. multifillis infection in fish. Polynuclectide or protein controlling a portion of the amplified product encoding and controlling in the controlling
                                                                                                                                                                                                                                                                                                                                                                 Immobilisation antigen; i-antigen; ichthyophthirlasis; vaccine; white spot disease; freshwater fish; immune response; infection control.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Novel i-antigen polypeptides and polynuclectides from Ichthyophthirius multifiliis, useful for prophylaxis and treatment of Ichthyophthirius infection in fish
                                                                                                                                                                                                                                                                                                                    IAG48 (G1) surface protein amino acid sequence.
440 LPESAKKNIQC --- DFANFLSISLLLISYYLL 468
                            Disclosure; Figure 8; 144pp; English.
                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GEORGIA RES FOUND INC.
                                                                                                                                                                     AAB25889 standard; Protein; 409
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Lin T;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CORNELL RES FOUND INC.
CLARK T G.
DICKERSON H W.
                                                                                                                                                                                                                                                                                                                                                                                                                                         Cohthyophthirius multifiliis.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               99US-0122372.
99US-0124905.
99US-0131121.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          04-FEB-2000; 2000WO-US02962.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          99US-0118634
                                                                                                                                                                                                                                                                      (first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Dickerson HW,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         WPI; 2000-506071/45.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         WO200046373-A1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              LIN T
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               (UYGE-) UNIV
                                                                                                                                                                                                                                                                 18-DEC-2000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    J2-MAR-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      17-MAR-1999;
27-APR-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          04-FEB-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       10-AUG-2000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Clark TG,
                                                                                                                                                                                                                     AAB25889;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           (CLAR/)
(DICK/)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              (LINIT)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CORR
                                                                                                                                            AAB25889
                                                                                                                       RESULT
                                                                                                                                                                                         ò
```

9

```
AAB25883;
                                                                                                                                                                                                                                                                                                                                                    æ
                                                                                                                                                                                                                                                                                                                                                            AAB25883
                                                                                                                                                                                                                                                                                                                                                     RESULT
                                                                                                                                                                                                                                                                                                                                                                           ŏ
                                                                                                                                                                                                                                                                                              g
                                                                                                                                                                                                                                                                                                               ΩŽ
                                                                                                                                                                                                                                                                                                                            q
               18;
                                                                                                                                                                                                                                                                                                                                                                           Immobilisation antigen; i-antigen; ichthyophthiriasis; vaccine; white spot disease; freshwater fish; immune response; infection control.
                                                                                                                                                                    341
                                                                                                                                                                                                        cvpcqinkn-dspatagaqanlatqcstqcptgtaiqdgvtlvfsnsstqcsqcianyff 295
                                                                                                                                                                                                                                79 PNPPATANLVTQCNVKCPAGTAIAGGATDYAAIITECVNCRINFYNENAPNFNAGASTCT 138
                                                                                            139 ACPVNRVGGALTAGNAATIVAQCNVACPTGTALDDGVTTDYVRSFTECVKCRLNFYYNGN 198
                                                                                                                           N.-GNTP----FNPG-----KSQCTPCPAIKPANVAQATLGNDATITAQCNVACPD 243
                                                                                                                                                                                                                         DGNNFQAGSSRCKACPANKVQGAVATAGGTATLIAQCALECPAGTVLTDGTTSTYKQAAS 401
                Gaps
                              23 CPVGTETNTAGQVD----DLGTPANCVNCQKNFYYNNAAAFVPGASTCTPCPQKKDAGAQ 78
                                             4 cpdgtqtq-agltdvgaadlgt---cvncrpnfyynggaa-------qgean 44
                                                                                                                                                          GTISAAGVNNWVAQNTE---CTNCAPNFYNN-----NAPN---FNPG------NST
                                                                                                                                                                                          CLPCPANKDYGAEATAGGAATLAKQCNIACPDGTAIASGAT-NYVILQTECLNCAANFYF
                                                                                                                                                                                                                                                        ECVKCAANFYTTKQTDWVAGIDTCTSCNKKLTSGAEANLPESAKKNIQCDFANF 455
                                                                                                                                                                                                                                                                 111;
DB 21; Length 409;
31.6%; Score 801.5; DB 21; Length 39.5%; Pred. No. 9.7e-56; ive 39; Mismatches 137; Indels
                                                                                                                                                                                                                                                                                                                                                            55kD i-antigen amino acid repeat sequence SEQ ID 57.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        FOUND INC
                                                                                                                                                                                                                                                                                                               ¥.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Τ;
                                                                                                                                                                                                                                                                                                               26
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Lin
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CORNELL RES FOUND INC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         99US-0122372.
99US-0124905.
99US-0131121.
                                                                                                                                                                                                                                                                                                                                                                                                    schthyophthirius multifiliis
                                                                                                                                                                                                                                                                                                                                                                                                                                                  04-FEB-2000; 2000WO-US02962
                                                                                                                                                                                                                                                                                                               AAB25885 standard; Peptide;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   99US-0118634
                                                                                                                                                                                                                                                                                                                                              (first entry)
Query Match
Best Local Similarity 39.55
Matches 187; Conservative
                                                                               45 gnqpfaan------
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         UNIV GEORGIA RES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Dickerson HW,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                DICKERSON H W.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       WPI; 2000-506071/45
                                                                                                                                                                                                                                                                                                                                                                                                                    WO200046373-A1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LIN T.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   04-FEB-1999;
                                                                                                                                                                                                                                                                                                                                              18-DEC-2000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          02-MAR-1999;
17-MAR-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         27-APR-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                    10-AUG-2000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Clark TG,
                                                                                                                                                                                                                                                                                                                              AAB25885;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          UYGE-)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       (CLAR/)
(DICK/)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LINT/)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CORR
                                                                                                                                                                                                                                         296
                                                                                                                                                                                                                                                                        354
                                                                                                             61
                                                                                                                            199
                                                                                                                                                            244
                                                                                                                                                                           179
                                                                                                                                                                                            283
                                                                                                                                                                                                           237
                                                                                                                                                                                                                           342
                                                                                                                                                                                                                                                         402
                                                                                                                                                                                                                                                                                                       AAB25885
                                                                                                                                                                                                                                                                                                                        g
                                                                                                                            δy
                                                                                                                                           g
                                                                                                                                                            ò
                                                                                                                                                                         Dp
                                                                                                                                                                                           δ
                                                                                                                                                                                                           g
                                                                                                                                                                                                                           ò
                                                                                                                                                                                                                                        g
                                                                                                                                                                                                                                                         ò
                                                                                                                                                                                                                                                                        g
                                               g
                                                               ò
                                                                            d
                                                                                              δ
```

```
intringens or immobilisation antiques are common to a variety of hymenostomatid ciliates and their expression varies in response to hymenostomatid ciliates and their expression varies in response to hymenostomatid ciliates and their expression varies in response to environmental stimuli. This invention relates to i-antigens in circulations and their sample of invention includes two polypeptide and polymuclectide sequences. The invention includes two polypeptide and polymuclectide sequences for two i-antigens, of 48 and 55 kD. Also included in the invention are antibodies capable of binding to the nucleotide sequences and a method for identifying I. multifillis serotypes using the nucleotide sequences. A composition (containing the i-antigen nucleotide) capable of eliciting an immune response in fish is useful for prophylaxis, treatment or for controlling I. multifillis infection in fish. Polynucleotide or protein vaccines comprising a portion of the amplified product encoding an antipent i -antigen polypeptide obtained is also useful for treating or preventing I. multifillis infection in fish. Sequences AAA97086.A97042, and AAA97060) and AAA97089 represent i-antigen genes and gene (excluding AAA97060) and AAA97089 represent primers used in the isolation of the i-antigen protein and peptide sequences. AAB25899-B25889 and AAB25893-B25906 represent i-antigen protein and peptide sequences.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ö
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Immobilisation antigen; i-antigen; ichthyophthiriasis; vaccine; white spot disease; freshwater fish; immune response; infection control.
Novel i-antigen polypeptides and polynucleotides from .Ichthyophthirius multifiliis, useful for prophylaxis and treatment of Ichthyophthirius infection in fish
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      165 CPTGTALDDGVTTDYVRSFTECVKCRLNFYYNGNNGNTPFNPGKSQCTPCPAIKPANVAQ 224
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       0; Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      invention relates to novel i-antigen polypeptide sequences
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Length 76;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        55kD i-antigen amino acid repeat sequence SEQ ID 55.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            16.7%; Score 424; DB 21;
100.0%; Pred. No. 1.1e-26;
iive 0; Mismatches 0;
                                                                                                                                             Disclosure; Figure 5b; 144pp; English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           (UYGE-) UNIV GEORGIA RES FOUND INC. (CORR ) CORNELL RES FOUND INC. (CLAR/) CLARK T G.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AA.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AAB25883 standard; Peptide; 72
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ichthyophthirius multifiliis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                99US-0118634.
99US-0122372.
99US-0124905.
99US-0131121.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                04-FEB-2000; 2000WO-US02962
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            (first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    225 ATLGNDATITAQCNVA 240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Sequence 76 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 WO200046373-A1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   02-MAR-1999;
17-MAR-1999;
27-APR-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       04-FEB-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            18-DEC-2000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    10-AUG-2000
```

02-MAR-1999; 17-MAR-1999; 27-APR-1999;

```
This invention relates to novel i-antigen polypeptide sequences.

I antigens or immobilisation antigens ar common to a variety of invention interestion varies in response to convirtnemental stimuli. This invention relates to i-antigens in response to inchipophthirius multifillis, a protozoan which is an obligate parasite of freshwater fish causing lichthyophthiriasis or white spot disease. The invention includes two polypeptide and polymucleotide sequences for two invention includes two polypeptide and polymucleotide sequences for two invention includes two polypeptide and polymucleotide sequences and a method of intention in multifillis sectifies sequences and a method of containing the i-antigen nucleotide sequences and a method of containing the i-antigen nucleotide sequences.

A composition (containing the i-antigen nucleotide) capable of eliciting an immune response in fish is useful for prophizaxis, treatment or for controlling I: multifillis infection in fish. Polynucleotide or protein artisent i-antigen polypeptide obtained is also useful for treating or preventing I: multifillis infection in fish. Sequences AAA97043-A97042, and AAA97065 and AAA97069 represent i-antigen genes and gene fragments identified in the invention. Sequences AAA97043-A97042, controlling in the invention of the invention is represent in the intention in the contain and gene in the invention is present in the intention in the contain and gene in the contain and an analyzation in the contain and gene in the contain and an analyzation in the contain and gene in the contain and an analyzation in the contain and gene in the contain and an analyzation in the contain and gene in the contain and an analyzation in the contain and gene in the contain and an analyzation in the contain and gene in the contain and an analyzation in the contain and gene and gene in the contain an analyzation in the contain and gene in the contain an analyzation in the protocortain and gene in the contain an analyzation in the contain an analyzation in the prot
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ö
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    fragments identified in the invention. Sequences AAA97043-A97064 (excluding AAA97060) and AAA97071-A9708B represent primers used in the isolation of the i-antigen gene sequences. Sequences AAB25899-B25889 and AAB25893-B25906 represent i-antigen protein and peptide sequences.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Immobilisation antigen; 1-antigen; 1chthyophthiriasis; vaccine;
white spot disease; freshwater fish; immune response; infection control.
                                                                                                                                                                                                                                                                                                                       Novel i-antigen polypeptides and polynucleotides from Ichthyophthirius multifillis, useful for prophylaxis and treatment of Ichthyophthirius infection in fish -
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ;
0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Query Match 15.9%; Score 404; DB 21; Length 72; Best Local Similarity 100.0%; Pred. No. 4.1e-25; Matches 72; Conservative 0; Mismatches 0; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           55kD i-antigen amino acid repeat sequence SEQ ID 58.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Disclosure; Figure 5b; 144pp; English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AAB25886 standard; Peptide; 71 AA
                                                                                                                                                    Lin T;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ichthyophthirius multifiliis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             04-FEB-2000; 2000WO-US02962.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               99US-0118634
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  18-DEC-2000 (first entry)
                                                                                                                                          Dickerson HW,
(DICK/) DICKERSON H
(LINT/) LIN T.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               83 ATANLVTQCNVK 94
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               WPI; 2000-506071/45
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 72 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 WO200046373-A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     04-FEB-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               10-AUG-2000
                                                                                                                                     Clark TG,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AAB25886;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAB25886
```

q à ò

```
This invention relates to novel i-antigen polypeptide sequences.

I-antigens or immobilisation antigens ar common to a variety of
I-antigens or immobilisation antigens ar common to a variety of
I-antigens or immobilisation antigens are response to
cervironmental stimuli. This invention relates to i-antigens in
Ichthyophthirius multifilis, a protozoan which is an obligate parasite
of freshwater fish causing ichthyophthirias or white spot disease. The
invention includes two polypeptide and polynucleotide sequences for two
i-antigens, of 48 and 55 kD. Also included in the invention are
antibodies capable of binding to the nucleotide sequences and a method
for identifying I. multifilis serotypes using the nucleotide sequences.
A composition (containing the 1-antigen nucleotide) capable of elicting
an immune response in fish is useful for prophylaxis, treatment or for
controlling I. multifilis infection in fish. Polynucleotide or protein
vaccines comprising a portion of the amplified product encoding an
antigenic 1-antigen polypeptide obtained is also useful for treating or
preventing I. multifilis infection in fish. Sequences AAA9703-A97042,
and AAA97060, AAA97065 and AAA97071-A97088 represent primers used in the
fragments identified in the invention. Sequences AAAS705-A97064
(excluding AAA97060) and AAA97071-A97088 represent primers used in the
isolation of the i-antigen gene sequences. Sequences.

ABESS833-BESS906 represent 1-antigen protein and peptide sequences.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Immobilisation antigen; 1-antigen; ichthyophthiriasis; vaccine; white spot disease; freshwater fish; Immune response; infection control.
                                                                                                                                                                                                                                                           Novel i-antigen polypeptides and polynucleotides from Ichthyophthirius multifillis, useful for prophylaxis and treatment of Ichthyophthirius infection in fish
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 241 CPDGTISAAGVNNWVAQNTECTNCAPNFYNNNAPNFNPGNSTCLPCPANKDYGAEATAGG 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Length 71;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       55kD i-antigen amino acid repeat sequence SEQ ID 60.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          15.9%; Score 403; DB 21; 100.0%; Pred. No. 4.8e-25; ive 0; Mismatches 0;
                                                                                                                                                                                                                                                                                                                                    Disclosure; Figure 5b; 144pp; English
                                                                      UYGE-) UNIV GEORGIA RES FOUND INC.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAB25888 standard; Peptide; 72 AA.
                                                                                                                                                                                        Lin
                                                                                        CORNELL RES FOUND INC
99US-0122372.
99US-0124905.
99US-0131121.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ichthyophthirius multifiliis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    18-DEC-2000 (first entry)
                                                                                                                                                                                  Dickerson HW,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               71; Conservative
                                                                                                                               DICKERSON H W.
                                                                                                                                                                                                                        WPI; 2000-506071/45.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           301 AATLAKQCNIA 311
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               71 AA;
                                                                                                                                                                                  Clark TG,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Sequence
                                                                                                        (CLAR/) (DICK/) (LINT/)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAB25888;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      RESULT 10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      à
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ð
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           g
```

ö

```
This invention relates to novel i-antigen polypeptide sequences.

1-antigens or immobilisation antigens ar common to a variety of
    I-antigens or immobilisation antigens ar common to a variety of
    I-antigens or immobilisation antigens ar common to a variety of
    Invention includes the invention relates to i-antigens in
    Invention includes two polypeptide and polypuclectide sequences for two
    I-antigens, of 48 and 55 kD. Also included in the invention are
    I-antigens, of and 55 kD. Also included in the invention are
    I-antigens, of and 55 kD. Also included in the invention are
    Invention includes two polypeptide and polypuclectide sequences and a method
    antibodies capable of binding to the nuclectide sequences and a method
    antipodies capable of binding the i-antigen nuclectide sequences.

A composition (containing the i-antigen nuclectide) capable of eliciting
    an immune response in fish is useful for prophlata; treatment or for
    an immune response in fish is useful for prophlata, treatment or for
    antigenic i-antigen polypeptide obtained is also useful for treating or
    antigenic i-antigen polypeptide obtained is also useful for treating or
    antigenic i-antigen polypeptide obtained is also useful for treating or
    antigenic i-antigen polypeptide obtained is also useful for treating
    and AAA97060, AAA97065 and AAA97069 represent i-antigen genes and gene
    fragments identified in the invention. Sequences AAA97045-A9704
    fragments identified in the invention are response in the
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ragments identified in the invention. Sequences AAA97043-A970b4 excluding AAA97060) and AAA97071-A97088 represent primers used in the excluding AAA97060) and AAA97071-A97088 represent primers used in the isolation of the i-antigen gene sequences. Sequences AAB25859-B25889 and
                                                                                                                                                                                                                                                                                                                                                                                                                                             Novel i-antigen polypeptides and polynucleotides from Ichthyophthirius multifiliis, useful for prophylaxis and treatment of Ichthyophthirius infection in fish
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AAB25893-B25906 represent i-antigen protein and peptide sequences
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Disclosure; Figure 5b; 144pp; English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAB25884 standard; Peptide; 70 AA.
                                                                                                                                                                                                                                      UYGE-) UNIV GEORGIA RES FOUND INC.
                                                                                                                                                                                                                                                    (CORR ) CORNELL RES FOUND INC
(CLAR,) CLARK T G.
(DICK/) DICKERSON H.W.
(LINT/) LIN T.
                                                                                                                        99US-0118634.
99US-0122372.
99US-0124905.
99US-0131121.
                                                                               04-FEB-2000; 2000WO-US02962.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  (first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Conservative
                                                                                                                                                                                                                                                                                                                                                                          Clark TG, Dickerson HW,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            442 ESAKKNIQCDFA 453
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     esakkniqcdfa 72
                                                                                                                                                                                                                                                                                                                                                                                                               WPI; 2000-506071/45.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Local Similarity
les 72; Conserv
40200046373-A1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                18-DEC-2000
                                                                                                                                  04-FEB-1999;
                                                                                                                                                    02-MAR-1999;
17-MAR-1999;
                                                                                                                                                                                                  27-APR-1999;
                                           10-AUG-2000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAB25884;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Query Match
Best Local S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  RESULT 11
AAB25884
ID AAB258
XX
AC AAB258
XX
DT 18-DEC
XX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              δy
```

```
ô
                                                                                      382 CPAGTVLTDGTTSTYKQAASECVKCAANFYTTKQTDWVAGIDTCTSCNKKLTSGAEANLP 441
                                               0; Gaps
15.3%; Score 389; DB 21; Length 72; 100.0%; Pred. No. 6.4e-24; ive 0; Mismatches 0; Indels
```

```
This invention relates to novel i-antigen polypeptide sequences.

I antigens or immobilisation antigens ar common to a variety of
I cantigens or immobilisation antigens ar common to a variety of
I we have a common to a variety of
I cantigens in response to
I chthyophthrius multifilis, a protozoan which is an obligate parasite
I chthyophthrius multifilis, a protozoan which is an obligate parasite
I chthyophthrius multifilis, a protozoan which is an obligate parasite
I chthyophthrius multifilis, a protozoan which is an obligate parasite
I chthyophthrius multifilis and polynuclectide sequences for two
I cantigens, of 48 and 55 kD. Also included in the invention are
I natigens, of 48 and 55 kD. Also included in the invention are
I cantigens, of binding to the nuclectide sequences and a method
antibodies capable of binding to the nuclectide sequences and method
antibodies capable of binding the i-antigen nuclectide sequences on immune response in fish is useful for prophizatis, treatment or for
an immune response in fish is useful for prophizatis, treatment or for
an immune response in fish is useful for prophizatis, treatment or for
antigenic l-antigen polypeptide obtained is also useful for treating
antigenic l-antigen principle obtained is also useful for treating
antigenic l-antigen in the invention. Sequences AAA97043-A97064
fragments identified in the invention. Sequences AAA97043-A97064
isolation of the l-antigen protein and peptide sequences.
AAB25893-B25906 represent l-antigen protein and peptide sequences.
                                 Immobilisation antigen; i-antigen; ichthyophthiriasis; vaccine; white spot disease; freshwater fish; immune response; infection control.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Novel i-antigen polypeptides and polynucleotides from Ichthyophthirius multifilis, useful for prophylaxis and treatment of Ichthyophthirius infection in fish
55kD i-antigen amino acid repeat sequence SEQ ID 56.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Disclosure; Figure 5b; 144pp; English.
                                                                                                                                                                                                                                                                                                                                                                 RES FOUND INC.
                                                                                                                                                                                                                                                                                                                                                                                CORNELL RES FOUND INC
CLARK T G.
                                                                                                   Ichthyophthirius multifiliis.
                                                                                                                                                                                                                                                                                    99US-0122372.
99US-0124905.
                                                                                                                                                                                                                          2000WO-US02962.
                                                                                                                                                                                                                                                                   99US-0118634
                                                                                                                                                                                                                                                                                                                              99US-0131121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Dickerson HW,
                                                                                                                                                                                                                                                                                                                                                                                                                   (DICK/) DICKERSON H W. (LINT/) LIN T.
                                                                                                                                                                                                                                                                                                                                                                     (UYGE-) UNIV GEORGIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           WPI; 2000-506071/45.
                                                                                                                                                 WO200046373-A1
                                                                                                                                                                                                                                                                                      02-MAR-1999;
17-MAR-1999;
27-APR-1999;
                                                                                                                                                                                                                              04-FEB-2000;
                                                                                                                                                                                                                                                                     04-FEB-1999;
                                                                                                                                                                                      10-AUG-2000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Clark TG,
                                                                                                                                                                                                                                                                                                                                                                                            CORR )
                                                                                                                                                                                                                                                                                                                                                                                                             (CLAR/)
```

ö Gaps ö 14.8%; Score 375; DB 21; Length 70; 100.0%; Pred. No. 8e-23; ive 0; Mismatches 0; Indels Conservative Local Similarity 70; Query Match Best Local S Matches

70 AA;

Sequence

155 ATIVAQCNVA 164 q οy ò

12 RESULT

ativaqcnva 70

61

g

372 ATLIAQCALE 381

à

```
Immobilisation antigen; 1-antigen; lchthyophthiriasis; vaccine;
White spot disease; freshwater fish; immune response; infection control.
                                                                                                                                                                                                                                                                                    Novel 1-antigen polypeptides and polynucleotides from Ichthyophthirius multifillis, useful for prophylaxis and treatment of Ichthyophthirius infection in fish
                                                      55kD 1-antigen amino acid repeat sequence SEQ ID 59.
                                                                                                                                                                                                                                                                                                                   Disclosure; Figure 5b; 144pp; English.
                                                                                                                                                                                                      UNIV GEORGIA RES FOUND INC.
CORNELL RES FOUND INC.
CLARK T G.
        AAB25887 standard; Peptide; 70 AA
                                                                                                                                                              99US-0118634.
99US-0122372.
99US-0124905.
                                                                                               Ichthyophthirius multifiliis
                                                                                                                                             04-FEB-2000; 2000WO-US02962
                                                                                                                                                                                      99US-0131121
                                       18-DEC-2000 (first entry)
                                                                                                                                                                                                                                                     Clark TG, Dickerson HW,
                                                                                                                                                                                                                              DICKERSON H W.
                                                                                                                                                                                                                                                                     WPI; 2000-506071/45.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    70 AA;
                                                                                                             WO200046373-A1
                                                                                                                                                                      02-MAR-1999;
17-MAR-1999;
27-APR-1999;
                                                                                                                                                              04-FEB-1999;
                                                                                                                              10-AUG-2000
                        AAB25887;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Sequence
                                                                                                                                                                                                     (UYGE-)
                                                                                                                                                                                                                                     (LINT/)
                                                                                                                                                                                                                      CLAR/
                                                                                                                                                                                                                               DICK
AAB25887
```

This invention relates to novel i-antigen polypeptide sequences.

I rantigens or immobilisation antigens ar common to a variety of frequences controlled in the invention includes and their expression varies in response to environmental stimuli. This invention relates to i-antigens in controlled in the invention and polymucleotide sequences for two invention includes two polypeptide and polymucleotide sequences for two included sequences for two included sequences for two included sequences for two included in the invention are antibodies capable of binding to the nucleotide sequences and a method for included in multifiliis services using the nucleotide sequences.

A composition (containing the i-antigen nucleotide) capable of eliciting an immune response in fish is useful for prophylaxis, treatment or for controlling I multifiliis infection in fish. Polynucleotide or protein antigence in antigent is antigen polypeptide obtained is also useful for treating or preventing I multifiliis infection in fish. Sequences AAA97064, and AAA97060 and AAA97089 represent I-antigen genes and gene (excluding AAA97060) and AAA97071-A97088 represent primers used in the isolation of the invention and peptide sequences.

```
ö
                                                        312 CPDGTAIASGATNYVILQTECLNCAANFYFDGNNFQAGSSRCKACPANKVQGAVATAGGT 371
                                      Gaps
                                                                        ö
       Length 70;
                                  Indels
  14.7%; Score 373; DB 21;
100.0%; Pred. No. 1.2e-22;
Live 0; Mismatches 0;
Query Match
Best Local Similarity 100.0
Matches 70; Conservative
```

င် g

This invention relates to novel i-antigen polypeptide sequences.

This invention relates to novel i-antigens ar common to a variety of

I-antigens or immobilisation antigens ar common to a variety of

I-antigens or immobilisation antigens ar common to a variety of

Intrommental stimuli. This invention relates to i-antigens in

Includes two polypeptide and polymcleotide sequences. The

Includes two polypeptide and polymcleotide sequences for two

I-antigens, of 48 and 55 kD. Also included in the invention are

Included in the invention of papale of eliciting

an immune response in fish is useful for prophylaxis, treatment or for

Included in the invention of the amplified product encoding an antigenic i-antigen polypeptide obtained is also useful for treating or

Including in multifillis infection in fish. Sequences AAA7033-A97042,

Including AAA97065 and AAA97089 represent i-antigen gene

Including AAA97060 and AAA97089 represent primers used in the

Including AAA97060 and AAA97089 represent primers used in the

Including AAA97060 and AAA97089 represent primers used in the

Including AAA97060 and AAA97089 represent primers used in the

Including AAA97060 and AAA97089 represent primers used in the

Including AAA97060 and AAA97089 represent primers used in the

Including AAA97060 and AAA97089 represent primers used in the

Including AAA97060 and AAA97089 represent primers used in the

Including AAA97060 and AAA97089 represent primers used in the

Including AAA97060 and AAA97089 represent primers used in the

Including AAA97060 and AAA97089 represent primers used in the

Including AAA97060 and AAA97089 represent primers used in the

Including AAA97060 and AAA97089 represent primers used in the

Including AAA97080 and AAA97089 represent primers used in the primers used in the primers used in the primers used in the primers used in t Immobilisation antigen; 1-antigen; lchthyophthiriasis; vaccine; white spot disease; freshwater fish; immune response; infection control. Novel i-antigen polypeptides and polynucleotides from Ichthyophthirius multifiliis, useful for prophylaxis and treatment of Ichthyophthirius infection in fish repeat amino acid sequence SEQ ID 12. Disclosure; Figure 5a; 144pp; English. UYGE-) UNIV GEORGIA RES FOUND INC. AAB25865 standard; Protein; 72 AA. Lin T; CORNELL RES FOUND INC CLARK T G. DICKERSON H W. Cchthyophthirius multifiliis 99US-0118634. 99US-0122372. 99US-0124905. 99US-0131121. 04-FEB-2000; 2000WO-US02962. (first entry) Clark TG, Dickerson HW, WPI; 2000-506071/45. 48kD i-antigen WO200046373-A1 LIN T. 02-MAR-1999; 17-MAR-1999; 27-APR-1999; 18-DEC-2000 04-FEB-1999; 10-AUG-2000 AAB25865; (CCAR) (LINIZ) Sequence (DICK/) AAB25865

20;

Gaps

Length 1700; Indels 101;

Query Match Best Local 1

AAB18144;

RESULT 14 AAB18144

ă

```
285 PCPANKDYGAEATAGG-----AATLAKQCNIACPDGTAIASGATNYVILQTEC-LNCAAN 338
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          797 acaat---gigataagaaaaaaaaaaaagataatagigaaggag----ctigcgctccat 849
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              850 -----atagacgattacatgtatgcgttagaaatttggaaaatatcaatgattata 900
                                                                                                                                                                                                                                                                                                                                                                                                                     699 cttcaatatgatt--ataatactaa-----tgttactcatggttttggtcaagagt 747
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ATLGNDATITAQCNVACPDGTISAAGVNNWVAQNTECTNCAPNFYNNNAPNFNPGNSTCL 284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           339 FYFDGNNFQAGSSRC---KACPANKVQG-----AVATAGGTATLIAQC----ALECPA 384
                                                                                                                                                                                                                                                                105 ATDYAAIITECVNCRINFYNENAPNFNAGASTCTACPVNRVGGALTAGNAATIVAQCNVA 164
                                                                                                                                                            56 AAAFVPGASTCTPCPQKKDAGAQPNPPATANLVTQCNVKCPAGT------AIAGG 104
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Purified laminin 2 protein, useful for research and therapeutic purposes including peripheral nerve regeneration, treatment of degenerative muscle disorders, anglogenesis regulation, and ex vivo
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               385 GTVLTDGTTSTYKQAASECVKCAANFYTKQTDWVA--GIDTCTS-----CNKKLTSGA 436
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               aaacgatatactac----tgaattgcatggtgatttgtcaaaagcaacatatccaaatg
                                                                                                                                                                                                                                                                                                                 at-aaacatcctga-----aggatcaac----agaaaataatccatgcaaa
                                                                                                                                                                                                                                                                                                                                                                    CPTGTALDDGVTTDYVRSFTECVKCRLNFYYNGNNGNTPFNPGKSQCTPCPAIKPANVAQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           748 atccttgtgaaacggacatagtagaacgtttttctgatacag-----aaggagc-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Laminin 2; human; nerve regeneration; angiogenic; cell adhesion; degenerative muscle disorder; muscular dystrophy; cell therapy.
                                                           ; Score 203.5; DB 21;
; pred. No. 2.4e-07;
10; Mismatches 194;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      (UYNE-) UNIV NEW JERSEY MEDICINE & DENTISTRY.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Human laminin 2 mature gamma-1 chain.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAB19802 standard; Protein; 1576 AA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               99US-0131720.
99US-0139198.
99US-0143289.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               28-APR-2000; 2000WO-US11378
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             99US-0155945
                                                                        8.0%;
27.2%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                05-MAR-2001 (first entry)
                                                                                                                         Matches 114; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     WPI; 2000-687537/67.
N-PSDB; AAA88902.
1700 AA;
                                                                                                      Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   WO200066730-A2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             15-JUN-1999;
12-JUL-1999;
24-SEP-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Homo sapiens
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    (urchenco P;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       30-APR-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   09-NOV-2000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AAB19802;
     Sequence
                                                                           Query Match
Best Local S
                                                                                                                                                                                                                                                                                                                                      658
                                                                                                                                                                                                                                                                                                                                                                                          165 (
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                a
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ŏ
                                                                                                                                                                                                                                                                                                                                                                                                                                        g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ŏ
     S
                                                                                                                                                                                                                                                                                                                                         g
                                                                                                                                                                                                                                                                                                                                                                                          Q
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Q
                                                                                                                                                                                                                                  g
                                                                                                                                                                                                                                                                                        δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                The present invention describes proteins and their fragments (I) encoded

The present invention describes proteins and their fragments (I) encoded

Also described are: (1) nucleotide sequences (II) encoding (I); and (2)

Also described are: (1) nucleotide sequences (II) encoding (I); and (2)

The falciparum infection of metalser of a monoclonal antisera or a monoclonal antibody raised to immunogens comprising the sequences of (I). are antibody raised to immunogens comprising the sequences of (I). are antibody raised to infection with P. falciparum. Furthermore, (I) (especially when they are rifins or secreted or membrane proteins)

Can aid the identification of drugs to treat or prevent P. falciparum in the cannot be used to identify drug resistance in the principarum. Sequencing of the plasmodium chromosome 2 and the P. falciparum. Sequencing of the plasmodium chromosome 2 and the complexity of parasite biology, a process hampered by the complexity of the parasite biology, a process hampered by the complexity of the parasite light of a resurgence of malaria in many arrest of the unit and the resistance to drugs and mosquito and the of the order of metals and now arrest of the unit and there is a process have led to a resurgence of malaria in many arrest of the order of malaria in many and the order of the order of malaria in many arrest of the complexity of the parasite resistance of malaria in many arrest of the complexity of the parasite in and provide new targets for any arrest of the complexity of the complexity of a process that of the parasite is a process that the parasite is a
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           parts of the world, and there is a pressing need for vaccines and new drugs. AAA70078 to AAA70287 and AAB18144 to AAB18352 represent nucleotide and protein sequences given in the present invention, but which are not specifically mentioned within the specification.
                                                              .
0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Plasmodium falciparum; chromosome 2; human malaria parasite; vaccine; antimalarial; malaria; protozoacide; infection; insecticide.
                                                                                                            382 CPAGTVLTDGTTSTYKQAASECVKCAANFYTTKQTDWVAGIDTCTSCNKKLTSGAEANLP 441
                                                              Gaps
                                                                                                                                         Proteins encoded by chromosome 2 of the human malarial parasite, plasmodium falciparum, useful as antimalarial vaccines and in the
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Plasmodium falciparum chromosome 2 related protein SEQ ID NO:1.
                                                              ;
0
             Length 72;
                                                              Indels
                                                                20;
          Score 212; DB 21;
Pred. No. 7.7e-10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Venter JC;
                                                                   12; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Disclosure; Page 29-33; 577pp; English
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  diagnosis of P.falciparum infection -
                                                                                                                                                                                                                                                                                                                                                                                                          AAB18144 standard; Protein; 1700 AA.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Gardner M,
                     8.3%;
53.6%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                98US-0107131.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  99WO-US26796
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 (first entry)
                                             Local Similarity 53.63
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Hoffman S, Carucci D,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Plasmodium falciparum
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                WPI; 2000-365347/31
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 HOFFMAN S.
CARUCCI D.
GARDNER M.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VENTER J C
                                                                                                                                                                                                                                442 ESAKKNIQC 450
                                                                                                                                                                                                                                                                                61 aeatqkvqc 69
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              WO200025728-A2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  05-NOV-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   05-NOV-1998;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 07-NOV-2000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  11-MAY-2000
```

(GARD/) (VENT/) (HOFF/) (CARU/)

cell therapy

Claim 5; Page 251-256; 305pp; English

The present sequence is that of human laminin 2 gamma-1 chain mature protein. Laminin-2 is composed of alpha-2 (400 kDa), beta-1 (100 kDa) chains. It is thought to be specifically required for stabilizing myotubes during skeletal muscle development, and for preventing apoptosis. Genetic defects in its congenital muscular dystrophy. Laminin 2 is also thought to be provided lamportant in Schwann cell/basal lamina interactions. The invention compenital muscular dystrophy. Laminin 2 is also thought to be important in Schwann cell/basal lamina interactions. The invention case AAB19791-806) and the polynucleotides encoding them (see AAB8891-906), methods for making recombinant laminin 2, cells that laminin 2 for research and therapeutic purposes including peripheral case recombinant laminin 2, and methods for using purified and interaction, treatment of degenerative muscle disorders. anglogenesis regulation, promoting cell attachment and migration, can interapy, improving the take of grafts, improving the confirmed conturner and preparing improved culture

1576 AA; Sequence

26; 75 AGAQPNPPATANLVTQCNVKCPAGTAIAGGATDYAAIITECVNCRINFYNENAPNFNAGA 134 135 STCTACPVNRVGGALTAGNAATIVAQC--NVACPTGTALDDGVTTDXVRSFTECVKCRLN 192 686 spcvlcacn--ghsetcdpetgvcncrdntagp-------hcekcsdg 724 193 FYYNGNNGNTPFNPGKSQCTPCP-----AIKP-----ANVAQATLGNDATITAQCN 238 239 VACPDGTISAAGVNNWVAQNTECTNCAPNFYNNNAPNFNPGNSTCLPCPAN----- 289 773 1-cddgyfgdplgrngpvrlcrlcqcsdnidpnavgncnrltgeclkciyntagfycdrc 831 KD-YGAEATAGGAATLAKQCNIAC-PDGTAIASGATNYVILQTECL------NCAAN 338 FYFDGNNFQAGSSRCKACPANKVQGAVATAGGTATL-1AQCALECPAGTVLTDGTTSTYK 397 Gaps Ouery Match
7.4%; Score 188; DB 21; Length 1576;
Best Local Similarity 23.9%; Pred. No. 3.7e-06;
Matches 99; Conservative 28; Mismatches 165; Indels 122; 339 290 g õ ŝ q ò g ò g ò

Search completed: December 26, 2001, 10:35:28 Job time: 214 sec

398 QAASECVKCAANFYTTKQTDWVAGIDTCTSCNKKLTSGAEANLPESAKKNIQCD 451

928